CLAIMS

What is claimed is:

1. A semiconductor-on-insulator (SOI) device comprising:

a semiconductor substrate layer;

an insulator layer disposed on the substrate layer;

a semiconductor active region disposed on the insulator layer, the active region including a source, a drain, and a body disposed therebetween, the source and body forming an abrupt or hyperabrupt source/body junction;

a gate disposed on the body such that the gate, source, drain and body are operatively arranged to form a transistor; and

an implanted region forming an interface between the body and the drain, the implanted region formed by tilted atom implantation in a direction towards the active region and under the gate from an angle tilted towards the drain with respect to vertical, the implanted region resulting in the formation of a graded drain/body junction.

2. The SOI device according to claim 1, wherein the angle is about 0 to about 20 degrees from vertical.

3. The SOI device according to claim 1, wherein the atoms are selected from germanium, xenon, silicon, argon and krypton.

4. The SOI device according to claim 3, wherein the implanted atoms are germanium at a dose of about $1x10^{14}$ atoms/cm^2 to about $1x10^{15}$ atoms/cm^2.

5. The SOI device according to claim 4, wherein the implanted germanium atoms are implanted at an energy of about 10 keV to about 40 keV.

6. The SOI device according to claim 3, wherein the implanted atoms are germanium at an energy of about 10 keV to about 40 keV.

7. The SOI device according to claim 3, wherein the implanted atoms are germanium and result in a dopant concentration of about $1x10^{20}$ atoms/cm^3 in the implanted region.

8. The SOI device according to claim 1, wherein the implanted region is disposed partially in the body below a portion of the gate adjacent the drain and is disposed partially in the drain thereby extending laterally across at least a portion of the drain/body junction.

9. A method of forming a semiconductor-on-insulator (SOI) device, comprising the steps of:

providing an SOI wafer having a semiconductor active layer, a semiconductor substrate and a buried insulator layer disposed therebetween;

defining an active region in the active layer;

forming a source, a drain and a body in the active region, the source and the body forming an abrupt or hyperabrupt source/body junction;

forming a gate disposed on the body such that the source, drain, body and gate are operatively arranged to form a transistor; and

implanting atoms in a direction towards the active region below the gate at an angle from vertical tilted towards the drain side of the gate, the implanted atoms forming an implanted region resulting in the formation of a graded drain/body junction.

10. The method according to claim 9, wherein the angle is about 0 to about 20 degrees from vertical.

11. The method according to claim 9, wherein the atoms are selected from germanium, xenon, silicon, argon and krypton.

12. The method according to claim 11, wherein the implanted atoms are germanium is at a dose of about $1x10^{14}$ atoms/cm^2 to about $1x10^{15}$ atoms/cm^2.

13. The method according to claim 12, wherein the implanted germanium atoms are implanted at an energy of about 10 keV to about 40 keV.

14. The method according to claim 11, wherein the implanted atoms are germanium at an energy of about 10 keV to about 40 keV.

15. The method according to claim 11, wherein the implanted atoms are germanium and result in a dopant concentration of about $1x10^{20}$ atoms/cm^3 in the implanted region.

16. The method according to claim 9, wherein the implanted region is partially disposed in the body below a portion of the gate adjacent the drain and is disposed partially in the drain to extend laterally across at least a portion of the drain/body junction.